Design, synthesis and characterization of bio-relevant Supramolecular metal-organic frameworks

DEBASISH GHOSH

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Department of Chemistry
Visva-Bharati
Santiniketan, India

Supramolecular Chemistry is *chemistry beyond molecule*.[1,2,3].Supramolecular Chemistry focuses the chemical systems made up of molecular subunits assembled by non-covalent types of interactions including hydrogen bonding interactions, π···π interactions, lone pair···π interactions, van der Waals forces, different hydrophobic and electrostatic interactions, etc. whereas molecular chemistry deals with the construction molecules and generally, deals with bond-breaking and bond formation chemistry. Where the supramolecular Chemistry related with the construction of organized molecular arrays manifested by the interplay of versatile non-covalent types of interactions. Supramolecular Chemistry includes host-guest chemistry, self-assembly, and molecular recognition processes. Interaction between host and guest are noncovalent. Guest may be a monoatomic cation, a simple anion, a more sophisticated molecule such as hormone, pheromone, or neurotransmitter. Self-assembly, another important aspect of supramolecular chemistry, is a extemporaneous and reversible thermodynamic process organizes a disordered system of pre-existing components under thermodynamic equilibrium conditions into an ordered aggregate as a consequence of non-covalent interactions among the components themselves, without external direction and thus the self-assembly is defined as an autonomous association of components into an ordered patterns leading to an intriguing supramolecular networks.

I will try to synthesize most applicable bio-relevant supramolecular metal-organic frameworks of different metal ions specially Pt(II/IV) and other selective metal ions. I have an aim to establish an idea about the involvement of the primary structural motifs, the constitutional backbone of the supramolecular arrangements, towards the formation of supramolecular metal-organic architectures via non-covalent interactions involving specially hydrogen bonding interactions, π···π interactions, lone pair···π interactions, van der Waals forces, different hydrophobic and electrostatic interactions, and also search for the applications of these

supramolecules. These can be achieved by the design and synthesis of crystalline supramolecular materials those will be examined experimentally Transmission electron microscope (TEM), Scanning electron microscope (SEM), Atomic force microscope (AFM), IR, TG, CHN analysis, X-RAY Powder Diffraction(XRPD), Single crystal X-ray diffraction study, ESI-MS, UV-VIS and fluorescence spectra study, magnetic study, porosity study, etc.

Specially, I have an aim to instigate the bio-active material of Pt(II/IV)-directed supramolecular networks. I shall try to check its non-toxic nature and DNA-activity of the benign Pt(II/IV)-complex will also be investigated. The Pt(II/IV)-complex with free carbonyl moieties and metal coordinated amino derivatives placed at *cis* disposition may also be effective for antitumor activity. I will also try for several functional tests of these newly generated Pt(II/IV)-complexes *in vivo*.

I have also found the sensing nature of some extremely toxic metal ions in water medium and in biological system by exploiting these water soluble metallo-supramolecular networks. I will also plan to synthesize some supramolecular architecture using the transition metals including Cu^{2+}, Mn^{2+}, Co^{2+}, Cd^{2+}, Zn^{2+}. I will try to generate some single crystals of metallo-supramolecular architecture in water medium and characterize structurally, spectrally and magnetically. I have a plan to check the functionality like catalytic property, adsorption nature (if porous materials are found) of these newly synthesized different water soluble metallo-supramolecular materials. I also try to get the biological activity of the metallo-supramolecular networks.

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